

1. A table lookup method, comprising:
 providing to a graphical block diagram model a graphical block that defines a lookup
 table and having inputs for receiving input data; and
 using the graphical block to update content stored in the lookup table based on
 5 received input data.

2. The method of claim 1, wherein the graphical block includes block inputs, the block
 inputs including block input ports for connection to at least one other graphical block in a
 graphical block diagram model so that the input data can be received by the graphical block
 10 at the input ports from the at least one other graphical block.

3. The method of claim 1, wherein the graphical block includes a block output, the block
 output including a block output port for connection to at least one other graphical block in a
 graphical block diagram model, and wherein using comprises reproducing results of the
 content updating at the output port.

4. The method of claim 1, wherein the lookup table is used to capture the behavior of a
 plant, and the received input data comprises the input data and output data of the plant.

5. The method of claim 4, wherein the plant input data comprises a value for at least one
 plant input.

6. The method of claim 4, wherein the plant output data is measured data.

7. The method of claim 6, wherein the plant input data and output data are received from
 the plant in real-time.

8. The method of claim 6, wherein the plant input data and output data are read from a
 storage device.

9. The method of claim 4, wherein the block diagram model is a model of a plant that

includes a lookup table, and the plant output data is simulated data produced when the model is executed.

10. The method of claim 2, further comprising:

maintaining the graphical block in a block library; and
instantiating the graphical block to create the lookup table.

11. The method of claim 10, further comprising receiving parameters from a user to instantiate the graphical block.

12. The method of claim 11, wherein receiving comprises providing the user with a dialog box for specifying values of the parameters of the graphical block.

13. The method of claim 12, wherein the parameters comprise breakpoint data and initial table data.

14. The method of claim 2, further comprising receiving block parameters from a user to initialize the block, the parameters including breakpoint data and initial table data.

15. The method of claim 14, wherein the graphical block defines an adaptation process and wherein using comprises enabling the adaptation process to update the table content according to a statistical estimation algorithm.

16. The method of claim 15, wherein the plant input data is usable by the graphical block to determine a location in the lookup table.

17. The method of claim 16, wherein the location corresponds to a table cell.

18. The method of claim 17, wherein the table content to be updated is a value associated with the table cell.

19. The method of claim 15, wherein the adaptation process comprises a Recursive Sample Mean algorithm.

20. The method of claim 15, wherein the adaptation process comprises a Recursive Sample Mean algorithm and uses a forgetting factor to place more weight on most recently received plant output values.

21. The method of claim 17, wherein the location corresponds to a table cell and a particular operating point within the table cell, the location of the operating point within the cell being determined by interpolation of neighboring cell points.

22. The method of claim 21, wherein the table content to be updated comprises values of neighboring points used in the interpolation and wherein the adaptation process weights the updated values based according to results of the interpolation.

23. The method of claim 22, wherein the adaptation process comprises a Least Mean Squares algorithm.

24. The method of claim 22, wherein using comprises determining an adapted operating point by interpolation using the values of the neighboring points after such points have been updated by the adaptation process.

25. The method of claim 1, wherein using comprises executing the graphical block diagram model for simulation purposes.

26. A method of claim 1, wherein using comprises:
initializing the lookup table with initial table data and breakpoint data;
using the graphical block diagram of the graphical block diagram model as a
specification for interpretation by automatic code generation software that generates code to
perform computations equivalent to the computations performed by the graphical block
diagram model; and

executing the generated code in a controller of a real-time control application.

27. The method of claim 1, wherein the lookup table is included in a simulation model that simulates an embedded control system.

5 28. The method of claim 1, wherein breakpoint data specified by a user partitions the table into cells and the content that is updated is a cell value, further comprising:
adjusting the spacing of the breakpoint data to control the number of cells in the table.

29. The method of claim 2, wherein the block inputs further include an adaptation control
10 signal to enable or disable the lookup table content updating.

30. The method of claim 2, wherein the block inputs are configured to connect to a locking mechanism that restricts the content updating to a particular cell in the lookup table.

15 31. The method of claim 3, wherein the block output further includes a copy of the lookup table content at all table locations after the updating is completed.

32. The method of claim 3, wherein the block output includes a table index number corresponding to the location of the updated content.

20 33. A computer program product residing on a computer-readable medium that provides a table lookup, the computer program product comprising instructions causing a computer to:
provide to a graphical block diagram model a graphical block that defines a lookup table and having inputs for receiving input data; and
use the graphical block to update content stored in the lookup table based on received
25 input data.

34. A method, comprising:
operating a lookup table in a static lookup mode in which the table receives one or more input values, determines at least one previously stored value corresponding to the input

values, and produces output data using the at least one previously stored value; and

operating the lookup table in a dynamic adaptation mode in which the table receives the at least one input value and at least one additional value , and in which the table uses the at least one additional value to modify previously stored at least one value corresponding to the at least one input value.

35. The method of claim 34, wherein, in the dynamic adaptation mode, the table produces output data using the modified previously stored at least one value.

36. The method of claim 34, wherein the lookup table is defined by a block that is part of a block diagram model.

37. The method of claim 34, wherein the lookup table is operated in the dynamic adaptation mode in an interpreted block diagram environment, and further comprising, after operating the lookup table in the dynamic adaptation mode, generating compiled code using the modified previously stored at least one value, and using the compiled code to operate the lookup table in the static lookup mode.

38. The method of claim 34, wherein the at least one additional value is received from a sensor, and further comprising, during the dynamic adaptation mode, determining whether the sensor has failed and switching to the static mode if the sensor has failed.

39. The method of claim 34, comprising:

operating the lookup table in the static mode;

during operation in the static mode, switching to dynamic mode to update the previously stored at least one value; and

switching back to static mode after the previously stored at least one value has been updated.